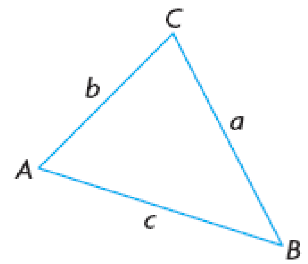
MCR3U

Section 5.6 The Sine Law

HWK p 318 # 1-13

Recall that for triangle ABC , the sine law states the following

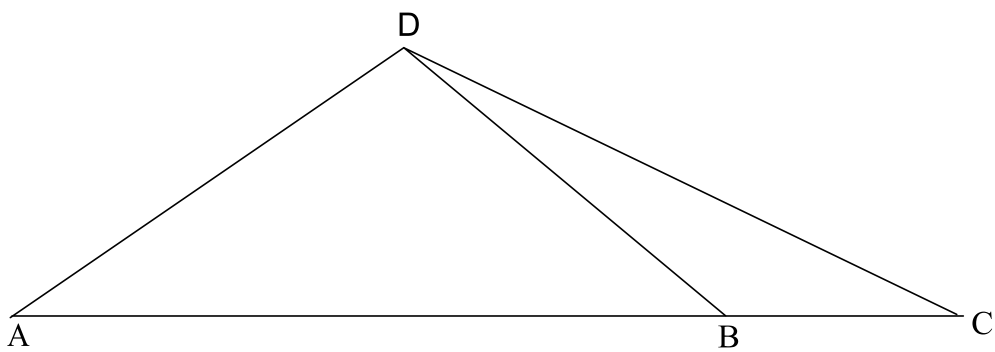
$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C} \quad \text{or} \quad \frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$$



Given any triangle, we can use the sine law if we know:

- two angles and any side (**AAS** or **ASA**) *or*
- two sides and one angle opposite a given side (**SSA**)

Eg. Three students measure the height of a tower. Alice and Bob are 650 m apart and on opposite sides of the tower . A third student , Chris, at point C measures the angle of elevation to the tower top to be 20^0 . Alice and Bob have measured their angles of elevation to be 41^0 and 37^0 respectively. How far is Chis from Bob?



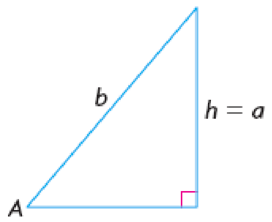
Section 5.6 The Sine Law

In the SSA situation multiple cases can arise. We can summarize as follows: (noting that each triangle has a height of $h = b \sin A$)

If <A is acute, there are four cases to consider.

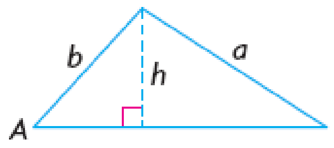
One Solution

If $\angle A$ is acute and $a = h$, one right triangle exists.



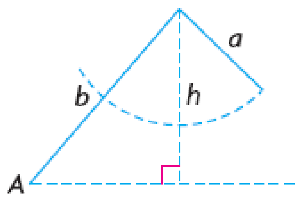
One Solution

If $\angle A$ is acute and $a > b$, one triangle exists.



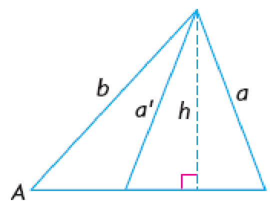
No Solutions

If $\angle A$ is acute and $a < h$, no triangle exists.



Two Solutions

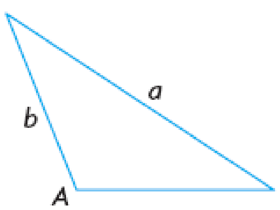
If $\angle A$ is acute and $h < a < b$, two triangles exist.



If <A is obtuse , there are two cases to consider

One Solution

If $\angle A$ is obtuse and $a > b$, one triangle exists.



No Solutions

If $\angle A$ is obtuse and $a < b$ or $a = b$, no triangle exists.